THE BOISE BASIN EXPERIMENTAL FOREST

for

better

forest

management

INTERMOUNTAIN FOREST
- & -
RANGE EXPERIMENT STATION

FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

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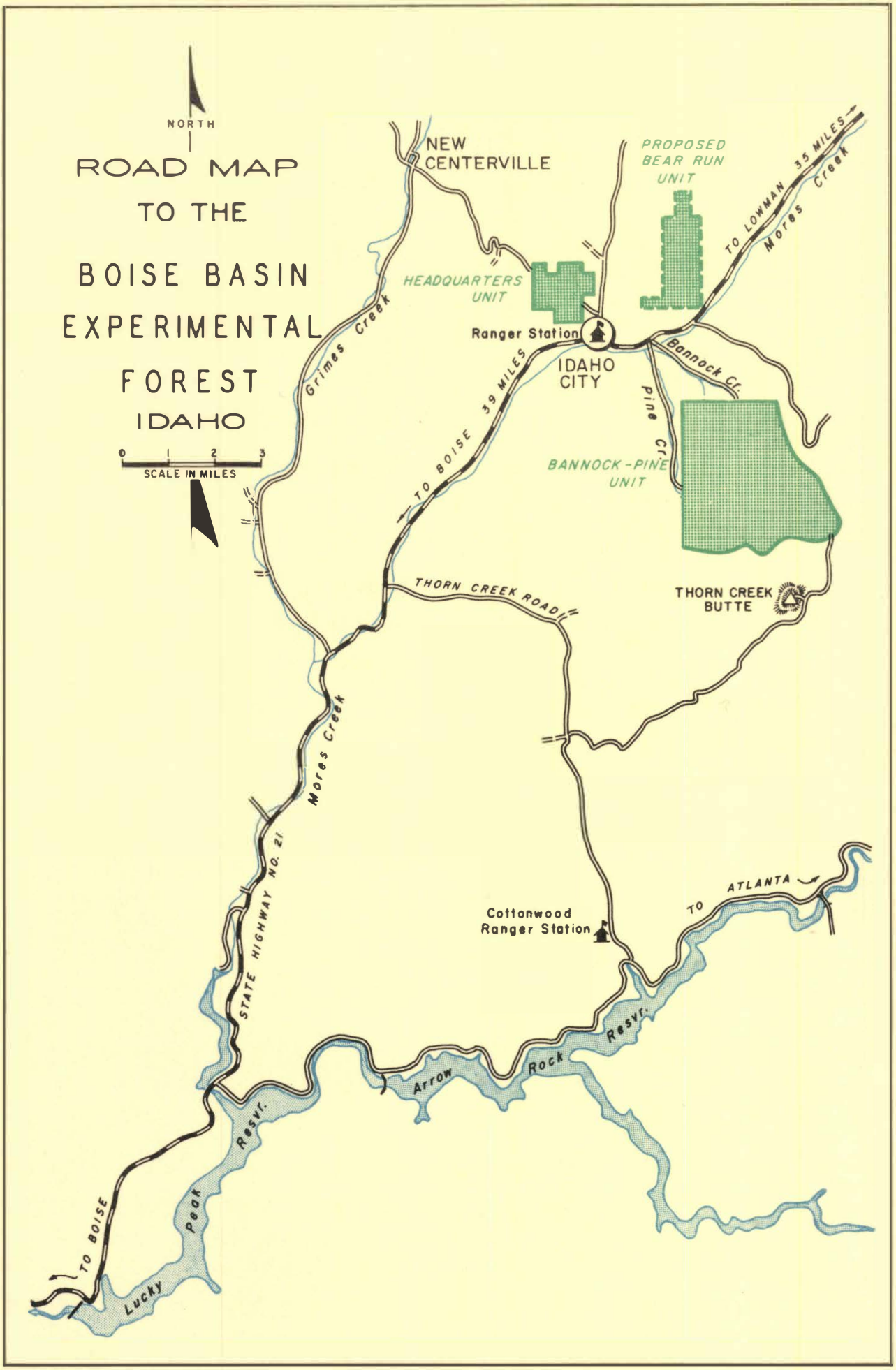

NORTH
ROAD MAP
TO THE
BOISE BASIN
EXPERIMENTAL
FOREST
IDAHO
0 1 2 3
SCALE IN MILES
NEW CENTERVILLE
PROPOSED BEAR RUN UNIT
TO LOWMAN 35 MILES
Mores Creek
HEADQUARTERS UNIT
Ranger Station
IDAHO CITY
Bannock Cr.
Pine Cr.
Grimes Creek
TO BOISE 39 MILES
BANNOCK-PINE UNIT
THORN CREEK ROAD
THORN CREEK BUTTE
Mores Creek
STATE HIGHWAY NO. 21
Cottonwood Ranger Station
TO ATLANTA
Arrow Rock Resvr.
Lucky Peak Resvr.
TO BOISE

THE BOISE BASIN EXPERIMENTAL FOREST
For Better Forest Management

By

Alvin K. Wilson
Division of Forest Management Research

The Boise Basin Experimental Forest is one of five experimental forests in the Intermountain Station's territory dedicated to the development of better ways of managing timberlands for the benefit of public and private foresters, landowners, timber operators, students, and research foresters.

The Experimental Forest had its beginning in 1933 when two tracts on the Boise National Forest near Idaho City, Idaho were set aside by the Chief of the Forest Service. An enlargement of one of these tracts was made in 1942 and the addition of a third tract is expected to be completed soon.

The Intermountain Forest and Range Experiment Station, Ogden, Utah, maintains and manages the Experimental Forest through its Boise Research Center in Boise, Idaho. The superintendent of the forest is a member of the Center's staff. Administrative tasks concerning fire protection, road building and maintenance, and timber sales from experimental cuttings are accomplished cooperatively with the Boise National Forest.

Ponderosa pine is the most important single tree species in the Intermountain Region and reaches its highest development in central Idaho and research on the Experimental Forest is

primarily concerned with problems in the management of this species. The forest is well located because of its accessibility and its proximity to the central Idaho group of national forests which produced over three-fourths of the ponderosa pine sawtimber cut in Fiscal Year 1956. In climate, soils, and topography, the Experimental Forest is typical of ponderosa pine lands in this general area.

CLIMATE AND SOILS

Many of the problems encountered by the researcher and practicing land manager in handling ponderosa pine in central Idaho are intimately connected with the region's distinctive climate and soils. Coping with them is made still more difficult by rugged topography and requires the full resourcefulness of the forester.

The average annual precipitation at Idaho City is about 22 inches. This amount in itself would not create particularly difficult management problems if it were not for the fact that most of it occurs during the winter months. Summer rainfall averages about 1.20 inches which usually falls in showers that provide little moisture for young seedlings. Consequently, soil moisture can decline during the summer months to very low levels and become critical for seedlings whose roots have not kept pace with its retreat.

The average annual temperature is about 45° F.; the range is from -40° to 108°. High summer temperatures can create soil surface temperatures in exposed places capable of killing very young seedlings. Freezing temperatures can occur in any month of the year.

The soils of both tracts are typical of those over much of the range of ponderosa pine in central Idaho. The underlying rock is largely granite which has produced, through decomposition, soil with a high proportion of sandy material. Such soils become very dry in summer and are subject to severe erosion during periods of spring snowmelt and during the short, heavy storms of summer, if plant cover has been depleted. Soil depths vary considerably with topography; in many places the soil forms only a thin covering on the parent granite.

PAST RESEARCH ACTIVITIES

Between 1933 and 1942, the Boise Basin Branch Experiment Station, as it was known then, was used as a headquarters and work center for a comprehensive program of research in ponderosa pine silviculture and investigations of soil erosion, snow retention, and streamflow. A number of plots were established on the Experimental Forest for the study of timber harvesting techniques, stand improvement practices, and reproduction problems. A small forest nursery was in operation from 1936 until 1942 to grow special stock for experimental plantings and to develop nursery techniques. Duplicate 11-acre watersheds in the brush-grass range type provided measurements of precipitation, surface runoff, seepage flow, and eroded material. Studies in forest fire protection, fire effects and reforestation of burned forest lands, growth in virgin stands, and growth after cutting were also carried on during this period at several locations on the Boise, Payette, and Salmon National Forests by men working out of Idaho City.

Curtailment of research work during World War II caused suspension of all activities on the Experimental Forest from 1942 to 1947. A further setback occurred in 1945 when the near-disastrous Warm Springs fire destroyed most of the timber on the Headquarters Unit and almost took the headquarters buildings.

Research activities on the Experimental Forest were resumed in 1947. Since then, efforts have been directed mainly at the silvicultural problems which arise in bringing virgin ponderosa pine stands under management, although several of the prewar studies have been continued.

THE HEADQUARTERS UNIT

The headquarters of the Experimental Forest is located three-fourths of a mile from Idaho City on the Idaho City-Centerville road. The buildings were constructed in 1934 and include an office, two residences, a lodge (formerly a combination of caretaker's residence and mess-hall), and a bunkhouse for field assistants and transient Forest Service personnel. They are in use during the field season from May until October or November and are closed during the winter months when deep snow precludes field work.

The surroundings of the headquarters afford an interesting glimpse into the history of the Boise Basin. Above and below the buildings several placer mining ditches remain as reminders of the gold which drew the first settlers to the Basin in the 1860's. The bare highwall and tailings left by the hydraulic mining of Gold Hill are in view to the east, and just south of the buildings the historic Idaho City cemetery borders the headquarters tract.

Northward from the buildings lies the 780-acre headquarters tract, most of which was added to the Experimental Forest in 1942. Elevations range from about 4,000 feet to 4,700 feet above sea level. The main topographical feature is the steep-sided canyon of Slaughterhouse Gulch which bisects the tract from southeast to northwest. Away from it, in the upper and lower portions, are areas of gentler slopes.

At the time the tract was set aside for research, most of it was covered by a fairly even-aged stand of second-growth ponderosa pine about 70 years old. The fringes of trees about the buildings, along the south edge of the tract, and along Slaughterhouse Gulch are about all that remain of the stands as they were at that time. A few study plots and enclosures remain in the unburned portions but the value of the tract for research in second-growth timber is largely gone. Most of the area is covered by brush species that followed the 1945 fire and, in this respect, is typical of the large burns in the Boise Basin. It does provide an opportunity for testing and improving methods for reforesting similar areas.

Regeneration Studies

Two studies initiated in 1956 provide a good start toward solving regeneration problems. The first of these is a plantation of 1,200 ponderosa pine seedlings on a southwesterly site which was chosen because it presents the most difficult environment for seedling survival. All seedlings were carefully planted in deep (18- to 20-inch) holes which were dug with a powered post-hole auger. The hole depth permitted the roots to be extended full-length into the ground and should enhance their chances for survival in periods

of deficient soil moisture. Parts of the plantation are being used to test the effectiveness of weed and brush killing chemicals for reducing plant competition.

Seedlings for the second study are being grown in the lath house shown in figure 1. The lath house provides a sprinkling system, rodent protection, and half-shade for ponderosa pine seedlings growing in approximately 5,000 cardboard tubes of several sizes. At the proper time, half the seedlings will be outplanted, tube and all, on the Headquarters Unit and half planted on lands of the Boise Payette Lumber Company, which

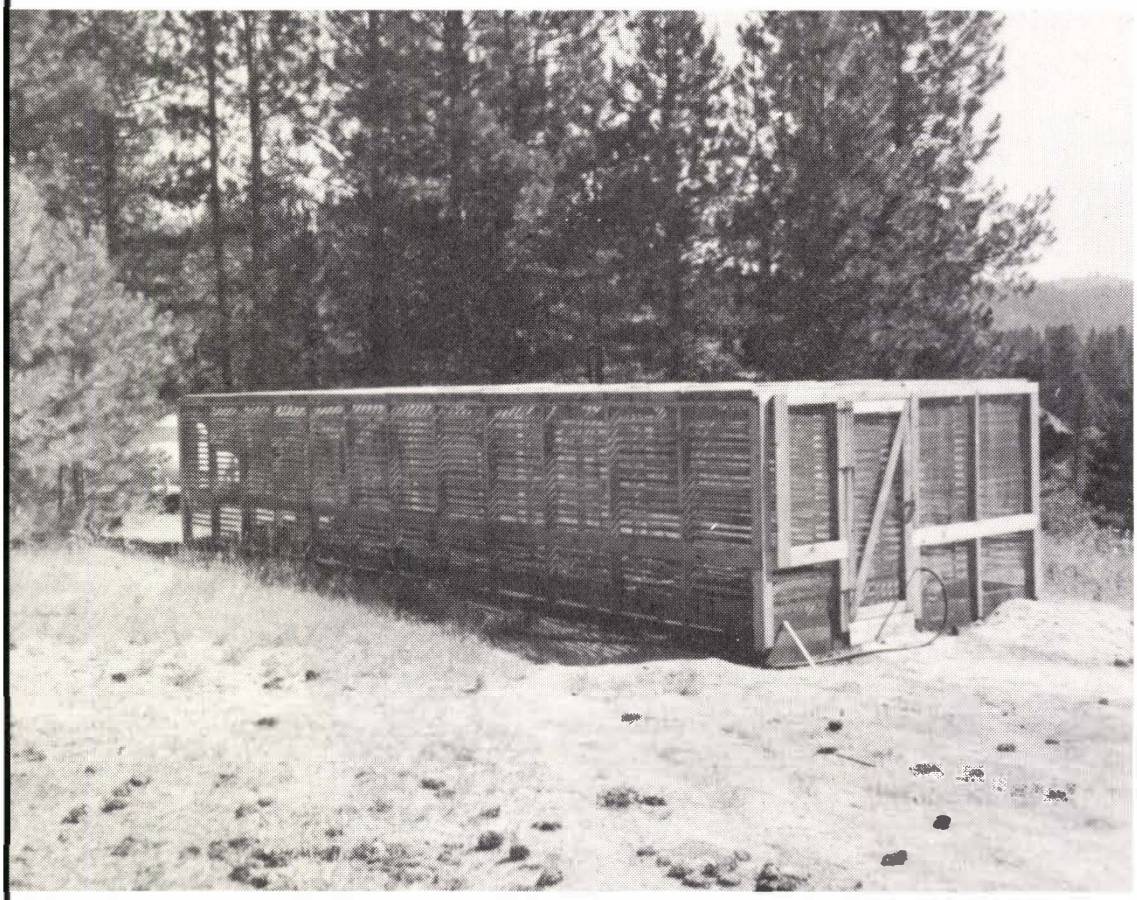


Figure 1.--Lath house at Experimental Forest Headquarters for growing special planting stock for artificial regeneration studies.

is cooperating in the study. It is hoped that by having undisturbed root systems, "trained" to go deeply into the ground, seedling survival on the most severe sites will be better than that heretofore obtained with regular nursery-grown stock.

THE BANNOCK-PINE UNIT

The main unit of the Experimental Forest lies 3 miles southeast of Idaho City in the drainages of Bannock and Pine Creeks, which are the main topographical features of the 5,292-acre tract. Both creeks rise within the unit and flow in a generally northward direction. The tract contains all of the upper reaches of Bannock Creek.

Elevations range from 4,400 feet above sea level at places on the north and west boundaries to 6,800 feet on part of the south boundary. The topography is dissected by watercourses, and steep slopes up to 84 percent are fairly common.

The 3,328 acres of the forest which lie in the Bannock Creek drainage include 3,103 acres of forested land which was, until 1953, in virgin timber composed of 2,787 acres of the ponderosa pine type and 316 acres of the Douglas-fir type. Aspen and brush occupy 225 acres. Small groups of alpine fir occur along the south boundary. Between 1953 and 1955, 841 acres of the pine type were cut over, leaving more than 1,900 acres of virgin ponderosa pine to form one of the few virgin pine stands of any size remaining in the Boise Basin.

The 1,964 acres lying in the Pine Creek drainage, practically all in the ponderosa pine type, were cut over in 1933-34.

At the time the Experimental Forest was established, the Bannock Creek portion contained approximately 35 million board feet of virgin timber averaging 14,500 board feet per acre. The cut-over stands in the Pine Creek portion contained nearly 9 million board feet, averaging 5,800 board feet per acre.

The U. S. Geological Survey has maintained a stream-gaging station on Bannock Creek since the early 1930's. Data from the station have been and will continue to be valuable for interpreting watershed studies in this drainage.

The Ponderosa Pine Production Study

With the reactivation of the Boise Basin Experimental Forest following the war-time suspension, the problems and past research in ponderosa pine management were appraised thoroughly to determine the future course of forest management research at the Intermountain Station. Developing methods for converting virgin ponderosa pine stands to managed stands of the highest potential timber production capacity proved to be the major problem. The prevention of deterioration of the land through all stages of the conversion process was an integral part of the problem. The ponderosa pine production study, installed by early 1955, was designed to provide comprehensive tests of two methods (silvicultural systems) of achieving this conversion. The following are some of the questions for which answers are sought:

1. What effect does harvesting old-growth ponderosa pine by the selection of individual trees for cutting have on the growth of the reserve stand as compared to harvesting groups of trees?

2. How much volume should be retained as growing stock on areas of different productive capacities to produce the highest net growth?

3. Which system of cutting creates stand conditions that are most favorable to the establishment and development of tree reproduction?

4. How much damage to young trees results from log skidding with light tractors as compared with heavy tractors?

5. What are the differences in forest floor disturbance and in soil movement and loss between several combinations of light or heavy logging machinery, group or single tree selection, and light or heavy cuts?

Sixteen compartments totaling 841 acres are involved in the study, of which eight were logged in 1953 and the remainder logged in 1954. Of the eight logged in 1953, four were logged by a large (D-8) caterpillar tractor and four by a small (D-4) caterpillar tractor; four were cut by single tree ("stem") selection and four by group selection; on four a high level of growing stock ("reserve") was retained and on four a low level of reserve was kept. Figure 2* will help clarify the application of these treatments. The eight compartments logged in 1954 were given the same combinations of treatments. The "volume classes" shown in this figure are three levels of original stand volume per acre and represent areas of different productive capacity. Each compartment of the experiment contains all three volume classes, which are delineated on the ground by blue paint-spotted trees. Compartment boundaries are marked by yellow paint spots.

* Figure 2 and unit maps follow text.

Table 1 shows the treatments applied to each compartment and illustrates how high and low reserve volumes were graduated according to the initial volume classes.

Several systems are recognized by foresters for selecting the trees to be cut and each one has a distinctive effect on the remaining stand. For this reason, the two systems used in this study were chosen carefully.

The stem selection method was chosen because it has been widely used in ponderosa pine timber sales (fig. 3) both in Idaho and elsewhere. Its objective is to obtain a high net growth rate on trees of the reserve stand by removing trees which are likely to die before the stands are cut again. This is a sound basis when it is appreciated that one great obstacle to achieving a high net growth rate is the large volume loss that occurs in cut-over ponderosa pine stands, chiefly due to insect attacks. By this method very small groups of trees may be cut, but typically the result is the removal of individual trees, well-scattered over the area. The effect is to maintain stands in which mature, immature, and young trees are thoroughly intermingled and in which reproduction must come in under the crowns of older trees or in the small openings created by cutting. The application of postlogging erosion control measures and stand improvement practices such as planting, pruning, and thinning, would be complicated to some extent by the widespread distribution of the trees removed.

Evidence has been accumulated to show that ponderosa pine may grow and reproduce still better when it is managed in groups where the trees are all of about the same age. This method, called group selection, is being tested on half of these

Table 1.--Treatments applied to compartments of Ponderosa Pine Production Study

Compartment	Total area	Year logged	Logging method	Marking method	Level of reserve: General	Level of reserve: Specific: Volume Class 1	Level of reserve: Specific: Volume Class 2	Level of reserve: Specific: Volume Class 3
	Acres		Tractor size			Board feet per acre		
1	54.8	1954	Large	Stem	Low	4,000	8,000	14,500
4A	43.2	1954	Small	Group	High	6,000	11,000	18,500
4B	40.4	1953	Large	Stem	Low	4,000	8,000	14,500
5	46.6	1954	Large	Group	Low	4,000	8,000	14,500
7	52.6	1953	Large	Stem	High	6,000	11,000	18,500
8A	43.0	1954	Small	Stem	Low	4,000	8,000	14,500
8B	42.0	1953	Small	Group	High	6,000	11,000	18,500
9	31.6	1953	Small	Group	Low	4,000	8,000	14,500
11A	39.0	1954	Large	Group	High	6,000	11,000	18,500
11B	71.3	1953	Small	Stem	High	6,000	11,000	18,500
15 & 16	79.5	1953	Small	Stem	Low	4,000	8,000	14,500
17	52.9	1954	Large	Stem	High	6,000	11,000	18,500
20	67.8	1954	Small	Group	Low	4,000	8,000	14,500
24A	45.8	1954	Small	Stem	High	6,000	11,000	18,500
24B	72.4	1953	Large	Group	High	6,000	11,000	18,500
28	54.9	1953	Large	Group	Low	4,000	8,000	14,500

Figure 3.--Prelogging (above) and postlogging (below) views of part of Volume Class 2, Compartment 15. Stem selection has removed the poorest overmature and mature trees and provided appreciable release for the sapling understory.

compartments to determine its adaptability to Idaho conditions (fig. 4). If successfully applied, several phases of management will be simplified by this relatively intensive system. Where stem selection perpetuates an indiscriminate mingling of trees of all ages, group selection is directed toward obtaining a series of small, even-aged stands from seedlings through to mature sawtrees, with each age class separate and distinct from the others.

A further requirement is that age classes should occupy equal acreages within the area being managed by group selection. To illustrate, let us consider an area of 500 acres in which five age classes are present and the trees reach maturity at 150 years. To be managed by group selection each age class should occupy 100 acres, and 100 acres of mature trees would be cut each 30 years. Tree reproduction would be secured as soon as practical in the openings created by removal of the mature trees. This arrangement would have the advantage of localizing erosion control measures, regeneration, and thinning to the group areas.

Since such well-balanced acreages of age classes cannot be expected to occur naturally on a given area, cuttings must be carefully planned to make the best use of existing distinct age classes and achieve the desired arrangement in the shortest possible time. Most virgin ponderosa pine stands contain a preponderance of mature and overmature timber. Progress in the initial stages of group selection management is regulated by the need for harvesting this timber, especially that part of it which is most susceptible to insect attacks.

Figure 4.--Prelogging (above) and postlogging (below) views of part of Volume Class 3, Compartment 20. Group clearcutting of mature trees has created an opening for artificial or natural regeneration. The group of immature sawtrees has been left as a seed source. Note the use of slash for skid trail erosion control.

More than 400 small plots of a special type are distributed randomly through all compartments of the production study. Data on the numbers and distribution of young trees, as well as growth rates of trees of all ages, are obtained from these plots. Comparisons of tallies made before and after logging afford information on the amount of damage done to trees by each of the two logging methods.

Surveys are being made regularly to determine the primary causes of sawtimber mortality such as insects, disease, and wind. These data will help determine the relative effectiveness of each of the two marking systems in obtaining a good net growth rate and provide a means of improving future marking practices.

The sale and logging of the 4,311,500 board feet of timber removed from the study compartments were administered by the Boise National Forest through an Administrative Use Contract with the Boise Payette Lumber Company. The company operator, MacGregor Triangle Company, furnished data for a cost study of each phase of the logging.

Watershed Management Studies

Good forest management requires an understanding of the consequences of all forest activities or practices. The maintenance of good watershed conditions is especially important in view of the climate, topography, and soils of central Idaho. To evaluate the effects of the equipment, marking systems, and volumes of cut in terms of soil disturbance and sediment production, the Station's Division of Watershed Management Research is conducting studies within and adjacent to the compartments of the Ponderosa Pine Production

Study. These investigations have already suggested means for improving road location and skidding practices and will yield valuable data for some time to come.

The most eye-catching feature of the watershed studies is the sediment dams constructed of planks and located on minor watercourses in the compartments. To serve as checks, there are also dams on watercourses where no logging has taken place. Dams of this type, by "stilling" the water flowing down the draw, allow the sediment which comes from logging roads and skid trails to settle out where its amount can be measured. Two dams are on perennial streams (in compartments 4A and 4B) which require the use of a special type of inlet, called a "drop-inlet," to regulate the level of the water behind the dam.

The amount of rainfall is important in determining the amount of soil movement. Rain gages are distributed through the compartments to measure this precipitation. Because not only the amount but the rate of rainfall is effective in causing erosion, one of the gages (in compartment 7) is a type that provides a continuous record of precipitation, and will afford measurements of both the intensity and duration of the short, but heavy, summer storms.

Roads, skid trails, and other areas from which soil could be expected to move prior to and following logging are being studied to determine the part that each contributes to the loss of soil through erosion and to improve methods of controlling this loss. Cross-ditches to divert water from roads which have been retired from regular use have been constructed at intervals which vary with the road gradient: the

steepest gradients have ditches 25 to 30 feet apart; on the lowest gradients they are as much as 100 feet apart.

The use of plugs or dams constructed from readily available logging slash in skid trails is also noteworthy, as is the use of shovelled cross-ditches in those portions of skid trails where slash was not available. Both the slash plugs and ditches were constructed with spacings related to the steepness of the skid trails; on the steepest slopes they are about 10 feet apart and on the gentler slopes as much as 50 feet apart. Up to the present, these structures have effectively controlled erosion on the areas disturbed by logging, but a better appraisal of their efficiency will be possible after they have undergone one or more high-intensity summer storms or a period of high snow-melt runoff.

The Pine Creek Methods-of-Cutting Plots

Seven plots, each 10 to 12 acres in size, were established during the 1933 logging of the Pine Creek drainage to study the effects of several of the methods in use at the time for selecting the trees to be harvested.

The four distinct methods used were: (1) economic selection, cutting only trees which had sufficient size and quality to pay all costs from stump to mill and allow a substantial profit; (2) diameter limit, removing all trees above a predetermined size; (3) scattered seed tree, taking all sawtrees except a few which were reserved to produce seed for a new stand; (4) tree class selection, removing all trees whose appearance suggested poor growth potentialities.

Table 2 summarizes some of the data obtained between 1933 and 1948. Although the methods of cutting which were employed then are seldom applied now, the data are useful for indicating what has been happening on lands where these methods were applied in the past.

Potentially these areas were capable of producing new wood at rates ranging from 37 to more than 130 board feet per acre annually, depending on the amount of growing stock of the reserve stand and postcutting mortality. The fact that all of them, and particularly those with reserve volumes of 7 to 9.5 thousand board feet per acre, fell so far below their possible growth rates is due to subsequent dying of trees in the reserve stand. This emphasizes the production gains that can be made through practices which control potential mortality. Prompt salvaging of trees already dead can also help to nullify such losses.

Besides the sawtree growth data, these plots have furnished information of value on reproduction establishment and survival and on the rate of development of pole-sized trees which was utilized in planning the Ponderosa Pine Production Study.

Table 2.--Net growth on Pine Creek methods-of-cutting plots[1/]

Plot	Method of cutting	Initial volume per acre	Cut volume	Reserve volume per acre	Average annual net growth	
					1933-38	1933-48
		Board feet	Percent	Board feet	Board feet	
1	15" diameter limit	14,974	96	617	19.7	48.8
2	Economic selection	19,707	63	7,281	47.3	55.3
3	24" diameter limit	22,083	80	4,328	-22.1[2/]	36.6
4	Scattered seed tree	15,016	88	1,750	6.3	22.2
5	Economic selection	19,966	53	9,468	-208.6	-38.2
6	Tree class selection	19,493	78	4,221	55.4	20.3
7	Tree class selection	17,552	50	8,829	106.1	46.3

1/ Scribner rule.
2/ Minus signs denote loss.

PLANS FOR FURTHER RESEARCH

For the successful reforestation of the thousands of acres of burned-over, brush-covered forest lands of central Idaho, means for improving the survival of planted tree seedlings are urgently needed. Parts of the Headquarters Unit, which provide typical large burn conditions, will be utilized in studies of site preparation, seedling stock, and planting techniques to fill this need.

The expected addition of 1,200 acres of even-aged, young timber to the Experimental Forest, the Bear Run Unit, will furnish an area on which intensive research in timber stand improvement measures--thinning, pruning, and crop tree release--can be conducted to provide guides for the better management of central Idaho's increasingly valuable second-growth stands.

Stand improvement work, begun in 1956 in the Ponderosa Pine Production Study compartments, is also expected to furnish useful information and demonstrations of suitable measures for the improvement of growth and quality in small stands of young trees which are intermingled with older stands. To date, premerchantable stands in three compartments have been thinned by two standard methods, crown thinning and low thinning.

Improvement cutting to better the composition and quality of these young stands was carried on in conjunction with the thinning. Slash from these cuttings was piled or occasionally lopped and scattered where concentrations were light.

In one of the four compartments, a tractor-mounted chipper was used for slash disposal. Slash chippers are being tested widely in woods operations for fire hazard reduction and to produce a wood chip mulch for possible erosion control in roads and skid trails.

The regeneration of the small clearcuttings in the group selection compartments of the Production Study, either naturally or by planting, will afford opportunities for observing the effectiveness of reproduction techniques.

MAKING RESEARCH RESULTS KNOWN

A research project is not completed until its results have been made available to those who can use them. This is accomplished by the publication of station notes or papers and articles in professional journals. The publications to date which are based on research at the Experimental Forest are listed in the back of this booklet. Copies of most of them may be obtained by writing the Director, Intermountain Forest and Range Experiment Station, Forest Service Building, Ogden, Utah.

A second means for disseminating research results is the show-me trip--a guided tour of the Experimental Forest. Show-me trips can be arranged by contacting the Boise Research Center, Intermountain Forest and Range Experiment Station, 316 East Myrtle Street, Boise, Idaho. Student and other groups interested, professionally or nonprofessionally, in the conservation of natural resources are welcome at the Boise Basin Experimental Forest.

PUBLICATIONS BASED ON STUDIES CONDUCTED
ON THE BOISE BASIN EXPERIMENTAL FOREST

CURTIS, JAMES D.

Destruction of paper tree tags by squirrels. Jour. Forestry 50(3): 220-221. 1952.

Response to release of ponderosa pine in central Idaho. Jour. Forestry 50(8): 608-610. 1952.

Effect of pregermination treatment on the viability of ceanothus seed. Ecology 33(4): 577-578. 1952.

A study of ponderosa pine production in central Idaho. Intermtn. Forest and Range Expt. Station Misc. Pub. 4, 9 pp. 1955.

Effects of origin and storage method on the germinative capacity of ponderosa pine seed. Intermtn. Forest and Range Expt. Station Research Note 26, 5 pp. 1955.

CURTIS, JAMES D., and ALVIN K. WILSON

Porcupine feeding on ponderosa pine in central Idaho. Jour. Forestry 51(5): 339-341. 1953.

HAUPT, H. F.

Snow accumulation and retention on ponderosa pine lands in Idaho. Jour. Forestry 49(12): 869-871. 1951.

MAKI, T. E.

Significance and applicability of seed maturity indices for ponderosa pine. Jour. Forestry 38(1): 55-60. 1940.

MOWAT, EDWIN L.

Damage by logging and slash disposal in Idaho ponderosa pine. Jour. Forestry 38(3): 247-255. 1940.

WILSON, ALVIN K.

Results of cutting overmature ponderosa pine in southern Idaho. Intermtn. Forest and Range Expt. Station Research Paper 28, 7 pp. 1951.

An age-vigor tree classification for Douglas-fir in central Idaho. Jour. Forestry 50(12): 929-933. 1952.

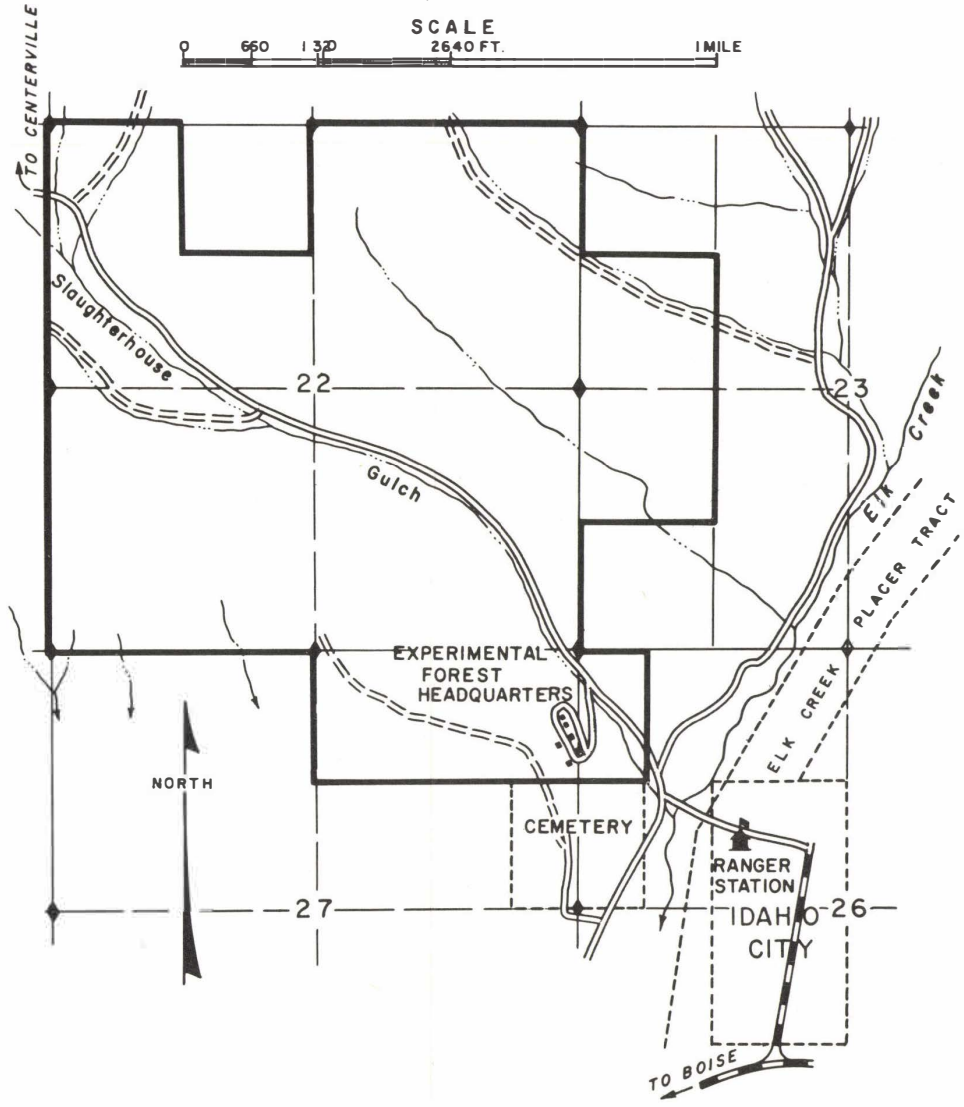
Tables for classifying age and vigor of Douglas-fir in central Idaho. Notebook material, unclas., 6 pp. 1952.

Storage and germination of Douglas-fir seed in central Idaho. Intermtn. Forest and Range Expt. Station Research Note 5, 3 pp. 1953.

Delineating ponderosa pine volume and site quality classes from aerial photographs. Intermtn. Forest and Range Expt. Station Research Paper 34, 19 pp., illus. 1954.

HEADQUARTERS UNIT
BOISE BASIN EXPERIMENTAL FOREST
IDAHO

T. 6 N., R. 5 E., BOISE MERIDIAN

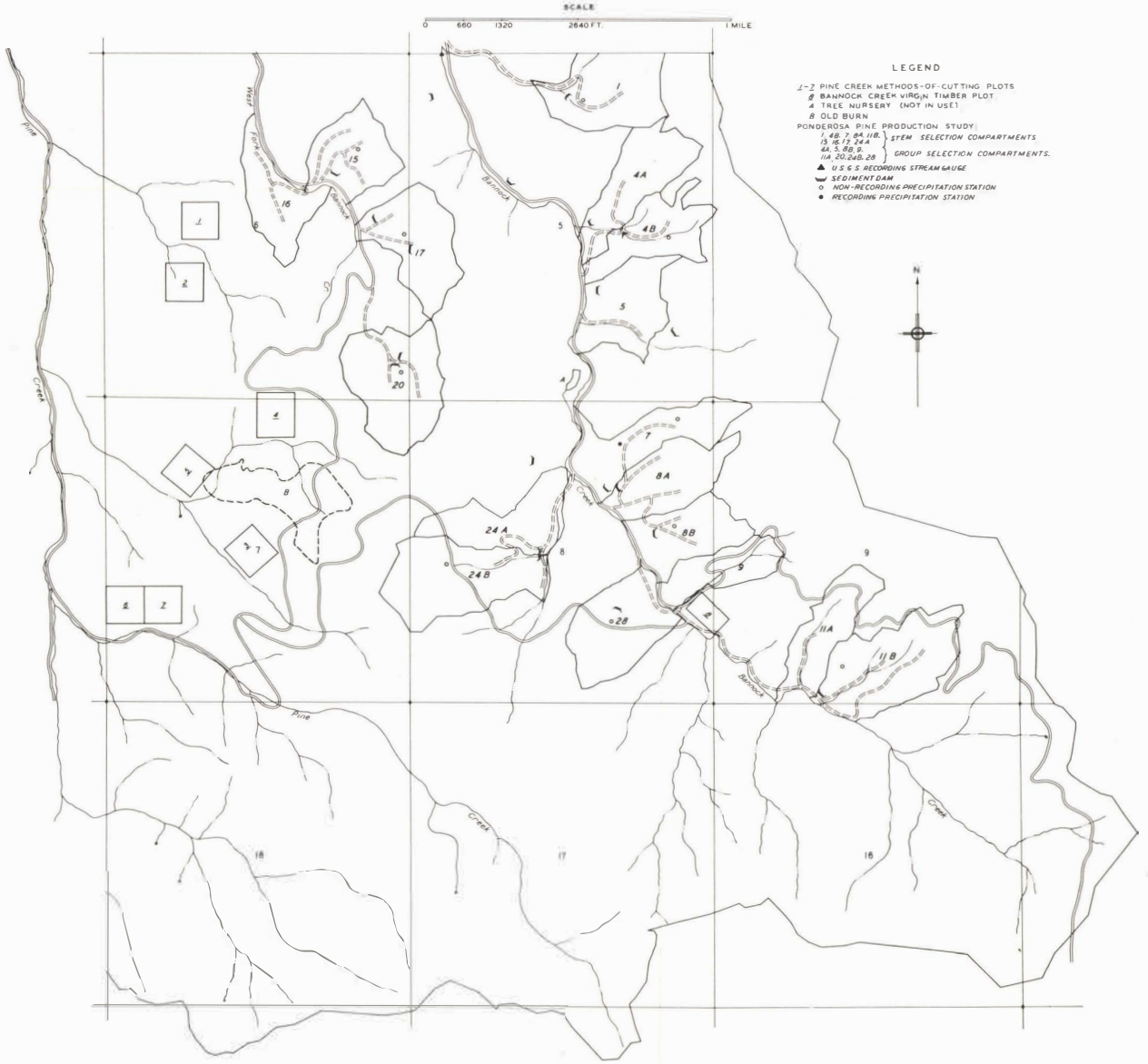


BANNOCK - PINE UNIT

BOISE BASIN EXPERIMENTAL FOREST

T. 5 N. R. 6 E. BOISE MERIDIAN

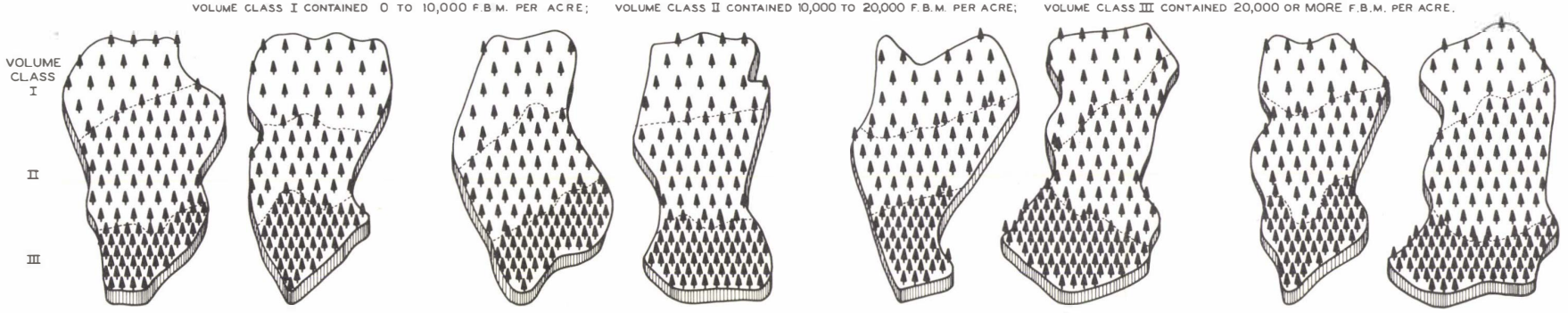
IDAHO



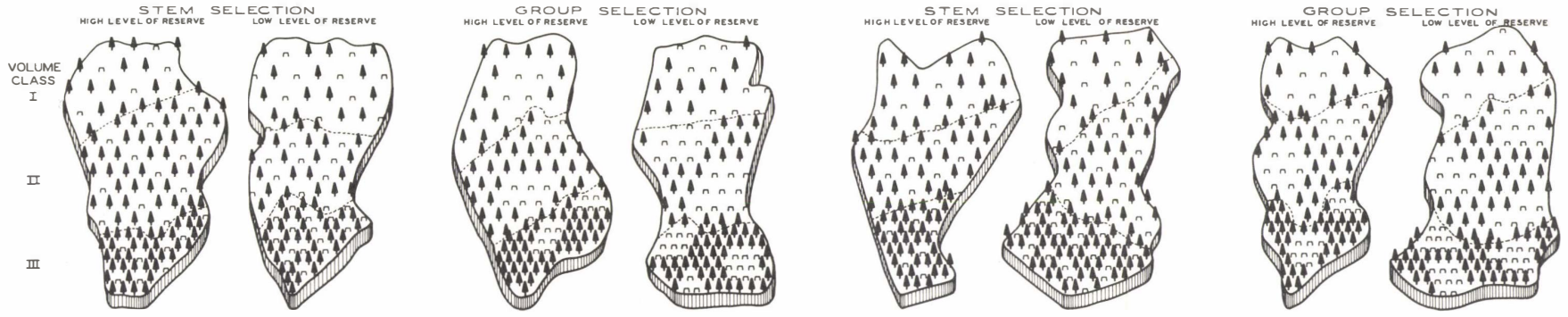
EXPERIMENTAL LAYOUT - PONDEROSA PINE PRODUCTION STUDY

ORIGINALLY THERE WERE EIGHT COMPARTMENTS (MINOR DRAINAGES) EACH CONTAINING THREE VOLUME CLASSES (STANDS) OF NOT LESS THAN TEN ACRES EACH.

VOLUME CLASS I CONTAINED 0 TO 10,000 F.B.M. PER ACRE; VOLUME CLASS II CONTAINED 10,000 TO 20,000 F.B.M. PER ACRE; VOLUME CLASS III CONTAINED 20,000 OR MORE F.B.M. PER ACRE.



EACH COMPARTMENT WAS CUT AND LOGGED DIFFERENTLY.

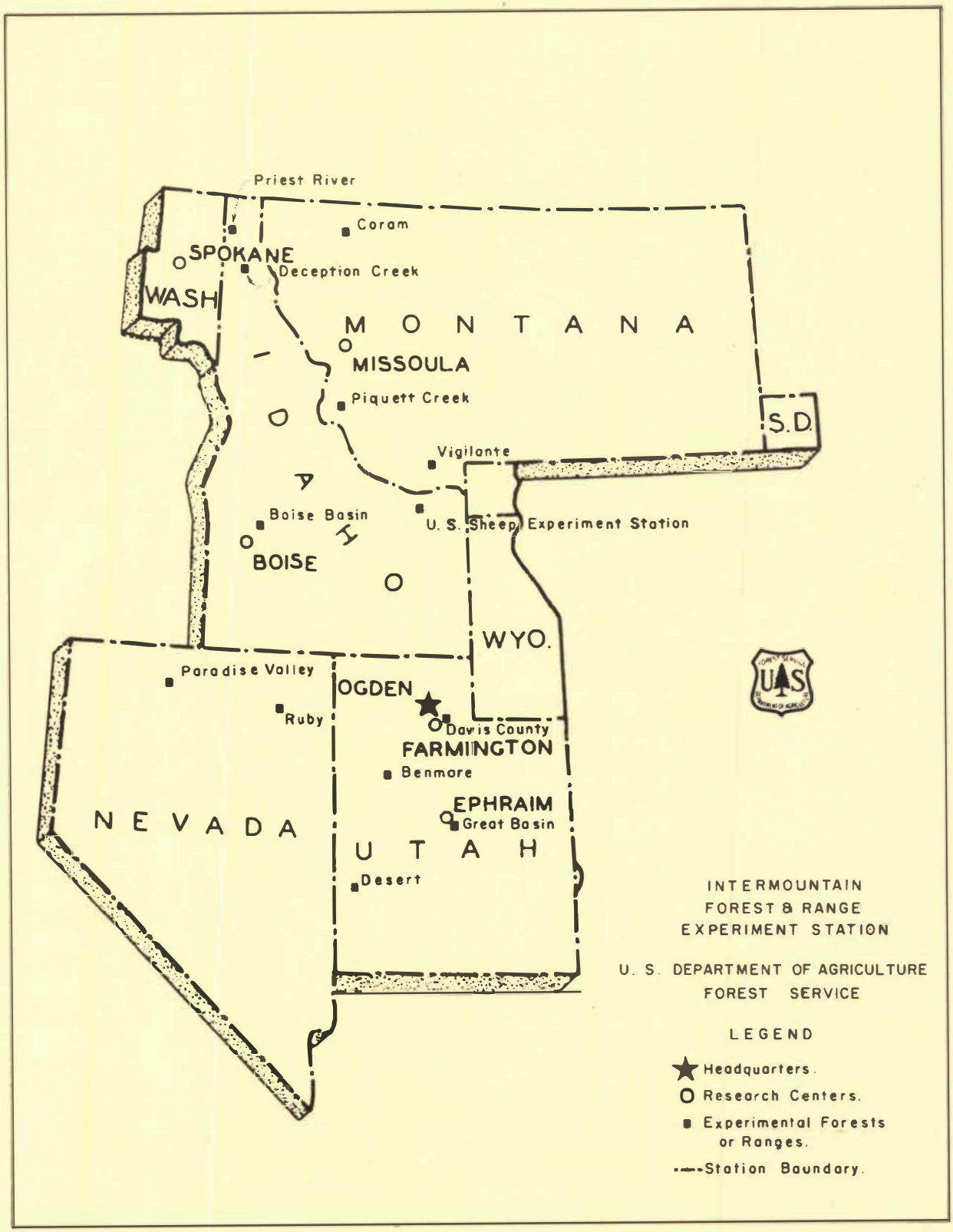


THESE COMPARTMENTS WERE LOGGED BY A D-4 TRACTOR.

THESE COMPARTMENTS WERE LOGGED BY A D-8 TRACTOR.

ONE OF TWO REPLICATIONS

FIGURE 2


Priest River
Coram
SPOKANE
Deception Creek
WASH
MONTANA
MISSOULA
Piquett Creek
S.D.
Vigilante
IDAHO
Boise Basin
U. S. Sheep Experiment Station
BOISE
WYO.
Paradise Valley
OGDEN
Ruby
Davis County
FARMINGTON
Benmore
EPHRAIM
Great Basin
NEVADA
UTAH
Desert
INTERMOUNTAIN
FOREST & RANGE
EXPERIMENT STATION
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LEGEND
Headquarters.
Research Centers.
Experimental Forests or Ranges.
Station Boundary.